



**BILLING CODE: 3510-22-P**

**DEPARTMENT OF COMMERCE**

**National Oceanic and Atmospheric Administration**

**RIN 0648-XD732**

**Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Shell Ice Overflight Surveys in the Beaufort and Chukchi Seas, Alaska**

**AGENCY:** National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

**ACTION:** Notice; issuance of an incidental harassment authorization.

**SUMMARY:** In accordance with the Marine Mammal Protection Act (MMPA) regulations, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to Shell Gulf of Mexico Inc. (Shell) to take marine mammals, by harassment, incidental to ice overflight surveys in the Chukchi and Beaufort Seas, Alaska.

**DATES:** Effective June 10, 2015, through June 9, 2016.

**ADDRESSES:** A copy of the issued IHA, application with associated materials, and NMFS' Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) may be obtained by writing to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910, telephoning the contact listed below (see **FOR FURTHER INFORMATION CONTACT**), or visiting the internet at: <http://www.nmfs.noaa.gov/pr/permits/incidental.htm>.

Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

**FOR FURTHER INFORMATION CONTACT:** Shane Guan, Office of Protected Resources, NMFS, (301) 427-8401.

**SUPPLEMENTARY INFORMATION:**

**Background**

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined “negligible impact” in 50 CFR 216.103 as “an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.”

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a

marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

### **Summary of Request**

On December 2, 2014, Shell submitted an application to NMFS for the taking of marine mammals incidental to ice overflight surveys the Chukchi and Beaufort Seas, Alaska. After receiving comments and questions from NMFS, Shell revised its IHA application on January 13, 2015. NMFS determined that the application was adequate and complete on January 15, 2015.

NMFS published a Notice of Proposed IHA in the **Federal Register** on March 3, 2015 (80 FR 11398). That notice contained in depth descriptions and analyses that are generally not repeated in this document. Only in cases where descriptions or analyses changed is that information updated here.

The following specific aspects of the proposed activities are likely to result in the take of marine mammals: ice overflight surveys using fixed and rotate winged aircraft when flying at low altitudes.

Shell has requested an authorization to take seven marine mammal species by Level B harassment. These species include: beluga whale (*Delphinapterus leucas*); bowhead whale (*Balaena mysticetus*); gray whale (*Eschrichtius robustus*); bearded seal (*Erignathus barbatus*); ringed seal (*Phoca hispida*); spotted seal (*P. largha*); and ribbon seal (*Histiophoca fasciata*).

### **Description of the Specified Activity**

#### *Overview*

Shell plans to conduct two periods of ice overflight surveys within the duration of the IHA: Break-up surveys and freeze-up surveys.

Shell plans to conduct the overflight surveys from fixed wing and rotary aircraft. Ice and weather conditions will influence when and where the surveys can be conducted.

#### *Specified Geographic Region*

The ice overflight survey areas are the Chukchi and Beaufort Seas, Alaska, as indicated in Figure 1-1 of Shell's IHA application. Aircraft supporting these surveys will operate out of Barrow and Deadhorse, Alaska.

#### *Detailed Description of Activities*

The Notice of Proposed IHA (80 FR 11398; March 3, 2015) contained a full description of Shell's planned operations. That notice describes in details the types of aircraft to be used in the surveys and the number of hours planned to conduct the surveys. There is no change on Shell's planned ice overflight surveys; therefore, the information is not repeated here. Please refer to the proposed IHA for the full description of the specified activity.

#### **Comments and Responses**

A Notice of Proposed IHA published in the **Federal Register** on March 3, 2015 (80 FR 11398) for public comment. During the 30-day public comment period, NMFS received 3 comment letters from the following: the Marine Mammal Commission (Commission); the Alaska Eskimo Whaling Commission (AEWC); Shell; and Dr. Doreen Dupont.

All of the public comment letters received on the Notice of Proposed IHA (80 FR 11398; March 3, 2015) are available on the internet at:

<http://www.nmfs.noaa.gov/pr/permits/incidental.htm>. Following are the public comments and

NMFS' responses.

*Comment 1:* The Commission notes that NMFS does not typically authorize the taking of cetaceans incidental to aerial overflights for purposes not associated with directed marine mammal research. The Commission recommends that NMFS develop criteria (e.g., based on aircraft type, aircraft speed, altitude, potential hovering / circling, and affected species or stocks) and guidance for determining when prospective applicants should request taking of cetaceans by Level B harassment from aircraft overflights.

*Response:* Takes of cetaceans (or other marine mammal species) incidental to aerial overflights depends on a variety of factors, such flight altitude, flight speed, types of aircraft, and species of marine mammals and their sensitivity to aircraft and their density in the vicinity under the flight route. Further review of Shell's proposed ice overflight survey activities and the marine mammal distribution and density in the Beaufort and Chukchi Seas, the propagation of aircraft noise into the water column, and the likelihood of underwater marine mammals being exposed to received levels that constitute a take prompted NMFS to revise its preliminary analysis in the **Federal Register** Notice of proposed IHA. The updated analysis presented in this document concludes that Shell's proposed ice overflight surveys in the Beaufort and Chukchi Seas would not adversely affect cetaceans due to the high flight altitude of most surveys, and the inefficiency of airborne noise being transmitted into the water column.

*Comment 2:* The Commission states that the density estimates for bearded seals in the winter may need to be adjusted upward to account for year-round presence in at least portions of the survey area. The Commission reasons that studies by MacIntyre *et al.* (2013) detected bearded seal calls year-round in the Beaufort Sea just east of Barrow, with an increase in calls

during winter and spring (December-June). The Commission recommends that NMFS (1) use density estimates for bearded seals in winter that are either equal to or greater than spring bearded seal density estimates and (2) recalculate take estimates for bearded seals during winter, accordingly.

*Response:* As stated in Shell's IHA application, few satellite-tagging studies have been conducted on these species in the Beaufort Sea. Winter surveys have not been conducted, and a few bearded seals have been reported over the continental shelf in spring prior to general break-up. However, the tracks of three bearded seals tagged in 2009 moved south into the Bering Sea along the continental shelf by November (Cameron and Boveng 2009). These species would be more common in the area during spring through fall, but it is possible that some individuals, bearded seals in particular, may be present in the area surveyed in winter. However, it can be concluded from Cameron and Boveng (2009) that the densities of bearded seals in the winter are much lower than in spring and fall. The Commission's assumption that just because bearded seals calls are detected in the winter months, does not lead to the conclusion that they are equally abundant in winter as they are in other seasons. Density estimates are highly uncertain from acoustic measurements as individual animals are responsible for multiple calls, the calling rate of bearded seals is not known, and individual calls can be detected over several kilometers and picked up by multiple recorders. NMFS, therefore, did not modify the take estimates for bearded seals.

*Comment 3:* The Commission recommends that NMFS incorporate the peer review panel's recommendations into the authorization if NMFS issues the incidental harassment authorization for Shell's proposed ice overflight surveys.

*Response:* NMFS conducted a peer review process to evaluate Shell's monitoring plan in early March 2015 in Anchorage, AK. The peer review panel submitted its report to NMFS in early April and provided recommendations to Shell. The panel's recommendations include:

(1) Training for the crew members on species identification and the recording of behavioral responses of pinnipeds to the aircraft, especially distance to animals and the altitude at which behavioral responses were observed;

(2) Use of a video camera during overflight surveys to record behavioral responses in addition to having PSOs and trained crew members record behavioral responses;

(3) Provide information on the altitude at which aircraft were flown and the distance and altitude at which behavioral responses were noted. Ideally a map should be included in the 90-day report that shows altitudes flown for different tracks and observed behavioral reactions; and

(4) Present sightings and behavioral response data separately for landing events.

In addition, though not requested, the peer review panel recommended additional mitigation measures to reduce potential impacts to marine mammals. These recommended mitigation measures include:

(1) Airplanes maintain an altitude of at least 305 m (1,000 ft) until they reach the offshore survey areas of interest, and not land on ice within 1.6 km (1 mi) of hauled-out pinnipeds; and

(2) Investigate the possibility of using unmanned aerial systems to conduct the ice surveys, at least for the fixed-wing surveys that would not involve landing on the ice to collect samples.

NMFS discussed with Shell the peer review panel report and went through these

recommendations. As a result, Shell agrees to provide information and produce a map on the altitude at which aircraft were flown and the distance and altitude at which behavioral responses were noted in its 90-day report, and present sightings and behavioral response data separately for landing events.

However, Shell currently is not able to implement the other monitoring measures and recommended mitigation measures due to safety, technological, and logistical reasons.

Therefore, these measures are not practicable and are not prescribed in the IHA issued to Shell.

A detailed discussion on the peer review process and recommendations is provided in “*Monitoring Plan Peer Review*” section below.

*Comment 4:* Noting that in the **Federal Register** notice (80 FR 11398; March 3, 2015) for the proposed IHA NMFS proposed a mitigation measures that “aircraft will not land on ice within 0.5 mi of hauled out pinnipeds or polar bears,” Shell points out that polar bears are not a NMFS trust species and requested NMFS to remove the reference of polar bears.

*Response:* NMFS updated the language and removed the reference of polar bears in the final IHA issued to Shell.

*Comment 5:* Referring to the proposed reporting measures in the **Federal Register** notice (80 FR 11398; March 3, 2015) that require Shell to include the following information in the 90-day report: (i) Time, date, and location (latitude/longitude) of the incident; (ii) the name and type of vessel involved; (iii) the vessel’s speed during and leading up to the incident; (iv) description of the incident; (v) status of all sound source use in the 24 hours preceding the incident; (vi) water depth; (vii) environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility); (viii) description of marine mammal observations in the 24 hours

preceding the incident; (ix) species identification or description of the animal(s) involved; (x) the fate of the animal(s); and (xi) photographs or video footage of the animal (if equipment is available), Shell points out that items (ii), (iii), and (v) reflect observations from a *vessel* and requests NMFS to modify these proposed reporting measures.

*Response:* NMFS revised the final IHA issued (ii) to read: “the name and type of aircraft involved”, and removed provisions (iii) and (v).

*Comment 6:* The AEWC states that the analysis in the **Federal Register** of potential impacts to subsistence uses should begin with a discussion of whether the operator has signed the Conflict Avoidance Agreement (CAA) and, if so, what the CAA includes as mitigation measures for subsistence activities.

*Response:* NMFS has defined “unmitigable adverse impact” in 50 CFR 216.103 as: “an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met. Therefore, the analysis of potential impacts to subsistence has a much broader scope than solely based on whether the applicant has signed a CAA. Nevertheless, in our analysis, we did consider the CAA negotiation between the Shell and the Native subsistence users. In the **Federal Register** notice for the proposed IHA, NMFS noted that Shell attended the 2012–2014 CAA negotiation meetings in support of exploration drilling, offshore surveys, and future drilling plans. Shell informed NMFS that it would do the same for

the upcoming 2015 exploration drilling program and has signed the CAA. Shell states that it is committed to a CAA process and will make a good-faith effort to negotiate an agreement every year it has planned activities.

*Comment 7:* The AEWC points out that the proposed IHA should also include general provisions for avoiding interference with bowhead whales or subsistence whale hunting activities. Specifically, the AEWC states that the IHA should require that aircraft routes are planned so as to minimize any potential conflict with bowhead whales or bowhead subsistence whaling activities, not operate below 1,500 feet in areas of active whaling, and stay at least 5 miles in-land when traveling over land until taking a perpendicular route from land to the start of the offshore survey area. AEWC also points out that Shell's IHA application, the Federal Register notice for the proposed IHA, and NMFS draft EA all note that aircraft will not operate below 1,500 feet in areas of active whaling, but the proposed IHA does not include this measure.

*Response:* NMFS has included the provision of requiring aircraft not flown below 1,500 feet in areas of active whaling in the IHA issued to Shell, as proposed in the **Federal Register** notice for the proposed IHA and the draft EA. Regarding requiring flight routes to be planned and limiting aircraft to stay at least 5 miles in-land when traveling over land until taking a perpendicular route from land to the start of the offshore survey area, NMFS conducted further analysis and discussed this proposed measure with Shell. Shell states that many of the ice survey areas far offshore locations and the aircraft needs a direct and the shortest route to access these areas for economics and safety concerns. In addition, as analyzed in this document, cetaceans in the open-water are not expected to be affected, and there are already mitigation measures in place for minimizing and/or avoiding pinniped impacts when the animals are hauled out. Furthermore,

Shell is required to communicate with the native communities to make sure that its activity will not have unmitigable impacts to subsistent use of marine mammals. Therefore, NMFS determined that such requirement does not contribute to our no-unmitigable adverse impact finding to subsistence harvest of marine mammals. NMFS further noted that this language appears in the 2015 CAA, which Shell has signed.

*Comment 8:* The AEWC points out that NMFS should include in its analysis of the effectiveness of mitigation measures, input from the peer review panel in its EA. The AEWC further states that the EA should also specifically identify each of the planned operations for the Beaufort and Chukchi seas during the 2015 open-water season and address the potential cumulative effects of these activities.

*Response:* The effectiveness of mitigation measures was addressed in the **Federal Register** notice for the proposed IHA, and the input from the peer review panel on Shell's monitoring plan is discussed in detail in this document. Both discussions were incorporated by reference in the final EA. The draft and final EA address cumulative effects from the IHA for Shell's planned ice overflight survey activities. Furthermore, cumulative effects from overall oil and gas development in the Arctic are reviewed in the *Chukchi Sea Planning Area Oil and Gas Lease Sale 193 in the Chukchi Sea, Alaska, Final Second Supplemental Environmental Impact Statement* prepared by the Bureau of Ocean Energy Management. NMFS evaluated the cumulative effects from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable actions in the entire Arctic to ensure an overarching analysis, because actions overlapping within close proximity to the proposed action can reasonably be expected to have more potential for cumulative effects on "shared resources" than actions that

may be geographically separated.

*Comment 9:* Dr. Doreen Dupont claims that Shell used vague irrelevant statistics, and that Shell oil drilling in itself is unnecessary and dangerous to the “heating environment.” Dr. Dupont says that the entire study should be banned.

*Response:* NMFS does not agree with Dr. Dupont’s assessment. First, the proposed IHA addressed in the **Federal Register** notice (80 FR 11398; March 3, 2015) is for ice overflight surveys, not for drilling activities. Further, the proposed IHA Notice provided in depth analyses on the potential impacts of Shell’s proposed ice overflight surveys on marine mammals and their habitat, and on the availability of marine mammals to subsistence use. NMFS was able to reach a determination that the issuance of an IHA will have a negligible impact on affected marine mammals species or stocks in the area, and will have no unmitigable adverse impact on their availability for taking for subsistence uses. Under the MMPA, an authorization for incidental takings shall be granted if NMFS can make those findings. Therefore, NMFS cannot deny Shell’s request based on its analysis.

*Comment 10:* Dr. Dupont points out that the analysis of aircraft noises was not based on particular aircraft speed and noise levels which Shell would like to use, therefore, a permit cannot be issued until exact aircraft to be used are known, already under contract with Shell. Further, Dr. Dupont claims that to allow these surveys without knowing exactly which aircraft are being used, down to the aircraft VIN numbers, leaves tremendous loopholes in which unanticipated damage can occur to marine mammals.

*Response:* NMFS does not agree with Dr. Dupont’s statement. Aircraft noise analysis was discussed in details in the **Federal Register** notice (80 FR 11398; March 3, 2015), with

references to scientific studies on general aircraft noise and its potential impacts to marine mammals, and transmission of airborne noise into water (Richardson *et al.* 1995).

*Comment 11:* Dr. Dupont points out that aircraft are flying hundreds of feet above sea level and use Fujinon 7 x 50 binoculars for visual monitoring, and that from that distance, with those binoculars, they will not be able “to see injuries to feet of seals by getting scratched or crushed in a mad run to the water from fear from the sound.” Dr. Dupont further claims that “[e]ven if the low estimates of animals was near accurate, by chance only, as so many factors have changed, and in the case of ringed seals in the winter, never counted.”

*Response:* NMFS does not agree with Dr. Dupont’s statement. The potential impacts of pinnipeds (ringed seals included) from aircraft overflight and noise are analyzed in the **Federal Register** notice (80 FR 11398; March 3, 2015) for the proposed IHA, which also includes an analysis on potential stampede. Since seals typically are found as individuals or in very small groups when they are in the project area, the chance of a stampede event is very unlikely. Finally, ice seals are well adapted to move between ice and water without injury, including “escape reactions” to avoid predators. Finally, seals do not have feet.

*Comment 12:* Dr. Dupont claims that “[i]llegal take, by injury from harassment from whales outside of water, will not be easily apparent by short fly overs. Should a whale matriarch develop injured hearing and echolocation capabilities, which the application maintains is unlikely but indeed possible if the whale breeches during the flyover and/or chase of hunt, then the entire pod will be permanently damaged and this may indeed effect survival of its species.”

*Response:* NMFS does not agree with Dr. Dupont’s statement. First, cetaceans do not typically stay outside the water, and breaching events by cetaceans are brief and are unlikely to

coincide with aircraft overflight. Second, as provided in details in the **Federal Register** notice (80 FR 11398; March 3, 2015), even for marine mammals outside water, such as hauled out seals, no injury or TTS is expected. Finally, none of the cetaceans in the Arctic forms matriarchal social groups.

*Comment 13:* Dr. Dupont states that the majority of the studies on ice distribution and its dampening effects of the sounds of the aircrafts are over 10 years old, and that with recent major shifts in “ice shelves,” melting and “water temperature shifts,” safe assumptions about whales and seals being protected cannot be made from such “old” statistics. Dr. Dupont “expects whales to be jumping out of water and as such, will be subject to loud sounds which could permanently damage their fine hearing and echolocation ability.”

*Response:* NMFS does not agree with Dr. Dupont’s statement. Ice coverage in the Arctic changes from year to year and in different seasons. The objective of Shell’s ice overflight surveys is to study the ice break-up and freeze-up in late spring and late fall, respectively. So these studies are timed to the period when there is ice coverage. Lastly, even during the flights when the aircraft is over open water, as discussed in detail in the **Federal Register** notice (80 FR 11398; March 3, 2015) and in this document, airborne noise from aircraft overflight does not transmit into the water column efficiently. Therefore, no cetacean is expected to be affected by Shell’s proposed ice overflight surveys.

*Comment 14:* Dr. Dupont claims that there is not real protection afforded to Native sustenance other than Shell’s say-so to cooperate with them, and that “[t]here are no outside agencies overlooking NMFS.” Dr. Dupont further goes on saying that “Shell executives have been known to schmooze local whale hunters to get them to cooperate with their own agenda”

and that “[i]n an attempt to charm the indigenous cultures of Alaska, a Shell oil company executive ate the raw meat of the endangered bowhead whale whenever it was offered to him, even though he didn't care for it.” Dr. Dupont states that “Shell can not be trusted to self-report, to not have conflicts of interests with their own POC, nor the interests and safeties of the endangered protected Marine Mammals, not the native whalers. NOAA itself must more directly oversee such a dangerous and delicate plan. Not NMFS and the Stranding Network.”

*Response:* NMFS does not agree with Dr. Dupont’s statement. First, regulations at 50 CFR 216.104(a)(12) require IHA applicants for activities that take place in Arctic waters to provide a Plan of Cooperation (POC) or information that identifies what measures have been taken and/or will be taken to minimize adverse effects on the availability of marine mammals for subsistence purposes. In order for NMFS to make a no unmitigable adverse impact determination on subsistence activity, Shell is required to work with the Alaskan subsistence communities to ensure that its activities are: (1) Not likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) Can be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

To meet these commitments, Shell conducted multiple meeting with the Arctic subsistence communities and developed a POC as required under the IHA issued. In addition, Shell signed a CAA with AEWC as a good faith agreement to ensure that its program will not affect subsistence whaling activities in the project area. By delegation NMFS administers the

marine mammal incidental take program and the NMFS Marine Mammal Stranding Network is authorized and has the expertise and skills related to marine mammal stranding issues, should they come up.

*Comment 15:* Dr. Dupont points out that since winter surveys for ringed seals have not been performed, it should not be assumed that their number is minimal or “negligible risk to behavioral disturbances.” Dr. Dupont further states that “[s]eals will panic to the sound of an airplane or helicopter overhead and in the panic may trample their babies, and or damage their feet with scrapes from their nails.”

*Response:* NMFS does not agree with Dr. Dupont’s statement. Although there is no density data on ringed seal in winter, its distribution, movement, and behavior are well studied and are described in the **Federal Register** notice (80 FR 11398; March 3, 2015) for the proposed IHA. During winter, ringed seals occupy landfast ice and offshore pack ice of the Bering, Chukchi, and Beaufort Seas. In winter and spring, the highest densities of ringed seals are found on stable shorefast ice. However, in some areas where there is limited fast ice but wide expanses of pack ice, including the Beaufort and Chukchi Seas and Baffin Bay, total numbers of ringed seals on pack ice may exceed those on shorefast ice (Burns 1970, Stirling *et al.* 1982, Finley *et al.* 1983). Adult ringed seals maintain breathing holes in the ice and occupy lairs in accumulated snow (Smith and Stirling 1975) while some subadult ringed seals appear to winter near the pack-ice edge in the Bering Sea (Crawford *et al.* 2012). Based on this knowledge, it is reasonable to use ringed seal density data obtained offshore aerial surveys of the pack ice zone conducted in spring 1999 and 2000 (Bengtson *et al.* 2005). Seal distribution and density in spring, prior to break-up, are thought to reflect distribution patterns established earlier in the year (i.e., during the

winter months; Frost *et al.* 2004).

Ringed seals give birth in lairs from mid-March through April, nurse their pups in the lairs for 5–8 weeks, and mate in late April and May (Smith 1973, Hammill *et al.* 1991, Lydersen and Hammill 1993). Finally, as stated earlier, ringed seals do not have feet.

### **Description of Marine Mammals in the Area of the Specified Activity**

The Chukchi and Beaufort Seas support a diverse assemblage of marine mammals, including: bowhead, gray, beluga, killer, minke, humpback, and fin whales; harbor porpoise; ringed, ribbon, spotted, and bearded seals; narwhals; polar bears; and walrus. Both the walrus and the polar bear are managed by the U.S. Fish and Wildlife Service (USFWS) and are not considered further in this proposed IHA notice.

Among the rest of marine mammal species, only beluga, bowhead, and gray whales, and ringed, spotted, bearded, and ribbon seals could potentially be affected by the proposed ice overflight activity. The remaining cetacean species are rare and not likely to be encountered during Shell's ice overflight surveys, which are planned either during winter when nearly 10/10 ice coverage is present, or during spring when sea ice also predominates the study area. Therefore, these species are not further discussed.

The bowhead whale is listed as “endangered” under the Endangered Species Act (ESA) and as depleted under the MMPA. The ringed seal is listed as “threatened” under the ESA. Certain stocks or populations of gray and beluga whales and spotted seals are listed as endangered under the ESA; however, none of those stocks or populations occur in the proposed activity area.

Shell's application contains information on the status, distribution, seasonal distribution,

abundance, and life history of each of the species under NMFS' jurisdiction mentioned in this document. When reviewing the application, NMFS determined that the species descriptions provided by Shell correctly characterized the status, distribution, seasonal distribution, and abundance of each species. Please refer to the application for that information (see **ADDRESSES**). Additional information can also be found in the NMFS Stock Assessment Reports (SAR). The Alaska 2013 SAR is available at:

[http://www.nmfs.noaa.gov/pr/sars/pdf/ak2013\\_final.pdf](http://www.nmfs.noaa.gov/pr/sars/pdf/ak2013_final.pdf).

Table 1 lists the seven marine mammal species under NMFS' jurisdiction with confirmed or possible occurrence in the proposed project area.

**Table 1. Marine mammal species and stocks that could be affected by Shell's ice overflight surveys in the Beaufort and Chukchi Seas.**

Common Name	Scientific Name	Status	Occurrence	Seasonality	Range	Abundance
<b>Odontocetes</b> Beluga whale (Eastern Chukchi Sea stock)	<i>Delphinapterus leucas</i>	-	Common	Mostly spring and fall with some in summer	Russia to Canada	3,710
Beluga whale (Beaufort Sea stock)	<i>Delphinapterus leucas</i>	-	Common	Mostly spring and fall with some in summer	Russia to Canada	39,258
<b>Mysticetes</b> Bowhead whale	<i>Balaena mysticetus</i>	Endangered; Depleted	Common	Mostly spring and fall with some in summer	Russia to Canada	19,534
Gray whale	<i>Eschrichtius robustus</i>	-	Somewhat common	Mostly summer	Mexico to the U.S. Arctic Ocean	19,126
<b>Pinnipeds</b> Bearded seal (Beringia distinct population segment)	<i>Erignathus barbatus</i>	Candidate	Common	Spring and summer	Bering, Chukchi, and Beaufort Seas	155,000
Ringed seal (Arctic stock)	<i>Phoca hispida</i>	Threatened; Depleted	Common	Year round	Bering, Chukchi, and	300,000

					Beaufort Seas	
Spotted seal	<i>Phoca largha</i>	-	Common	Summer	Japan to U.S. Arctic Ocean	141,479
Ribbon seal	<i>Histiophoca fasciata</i>	Species of concern	Occasional	Summer	Russia to U.S. Arctic Ocean	49,000

## Potential Effects of the Specified Activity on Marine Mammals

This section includes a summary and discussion of the ways that the types of stressors associated with the specified activity (e.g., aircraft overflight) have been observed to or are thought to impact marine mammals. This section may include a discussion of known effects that do not rise to the level of an MMPA take (for example, with acoustics, we may include a discussion of studies that showed animals not reacting at all to sound or exhibiting barely measurable avoidance). The discussion may also include reactions that we consider to rise to the level of a take and those that we do not consider to rise to the level of a take. This section is intended as a background of potential effects and does not consider either the specific manner in which this activity will be carried out or the mitigation that will be implemented or how either of those will shape the anticipated impacts from this specific activity. The “Estimated Take by Incidental Harassment” section later in this document will include a quantitative analysis of the number of individuals that are expected to be taken by this activity. The “Negligible Impact Analysis” section will include the analysis of how this specific activity will impact marine mammals and will consider the content of this section, the “Estimated Take by Incidental Harassment” section, the “Mitigation” section, and the “Anticipated Effects on Marine Mammal Habitat” section to draw conclusions regarding the likely impacts of this activity on the reproductive success or survivorship of individuals and from that on the affected marine mammal

populations or stocks.

The reasonably expected or reasonably likely impacts of the specified activities on marine mammals will be related primarily to localized, short-term acoustic disturbance from aircraft flying primarily over areas covered by sea ice with limited flight activity over open water and adjacent ice edges. The acoustic sense of marine mammals probably constitutes their most important distance receptor system. Potential acoustic effects relate to sound produced by helicopters and fixed-wing aircraft.

Dominant tones in noise spectra from helicopters are generally below 500 Hz (Greene and Moore 1995). Harmonics of the main rotor and tail rotor usually dominate the sound from helicopters; however, many additional tones associated with the engines and other rotating parts are sometimes present. Because of Doppler shift effects, the frequencies of tones received at a stationary site diminish when an aircraft passes overhead. The apparent frequency is increased while the aircraft approaches and is reduced while it moves away.

Aircraft flyovers are not heard underwater for very long, especially when compared to how long they are heard in air as the aircraft approaches an observer. Very few cetaceans, including the species in the proposed ice overflight survey areas, are expected to be encountered during ice overflights due to the low density of cetacean species in the winter survey area and small area to be flown over open water during spring. Most of these effects are expected in open-water where limited aircraft noise could penetrate into the water column. For cetaceans under the ice, the noise levels from the aircraft are expected to be dramatically reduced by floating ice. Long-term or population level effects are not expected.

Evidence from flyover studies of ringed and bearded seals suggests that a reaction to

helicopters is more common than to fixed wing aircraft, all else being equal (Born *et al.* 1999; Burns and Frost 1979). Under calm conditions, rotor and engine sounds are coupled into the water through ice within a 26° cone beneath the aircraft (Richardson *et al.* 1995). Scattering and absorption, however, will limit lateral propagation in the shallow water (Greene and Moore 1995). The majority of seals encountered by fixed wing aircraft are unlikely to show a notable disturbance reaction, and approximately half of the seals encountered by helicopters may react by moving from ice into the water (Born *et al.* 1999). Any potential disturbance from aircraft to seals in the area of ice overflights will be localized and short-term in duration with no population level effects.

Historically, there have been far greater levels of aviation activity in the offshore Chukchi and Beaufort Seas compared with that of the proposed ice overflights. None of this previous offshore aviation activity is believed to have resulted in long-term impacts to marine mammals, as demonstrated by results from a wide range of monitoring programs and scientific studies. Impacts to marine mammals from aviation activities in Arctic offshore habitats have been shown to be, at most, short-term and highly-localized in nature (e.g., Funk *et al.* 2013; Richardson *et al.* 1985a, b; Patenaude *et al.* 2002; Born *et al.* 1999).

The effect of aircraft overflight on marine mammals will depend on the behavior of the animal at the time of reception of the stimulus, as well as the distance from the aircraft and received level of sound. Cetaceans (such as bowhead, gray, and beluga whales) would need to be right at the surface, and thus have the potential to be disturbed, when aircraft fly over open water in between ice floes at low altitude (< 1,000 ft); seals may be disturbed when aircraft are over open water or over ice on which seals may be present. Disturbance reactions are likely to vary

among some of the seals in the general vicinity, and not all of the seals present are expected to react to fixed wing aircraft and helicopters.

A more comprehensive and in depth analysis of potential impacts to pinnipeds from Shell's proposed ice overflight surveys is provided in the *Federal Register* notice (80 FR 11398; March 3, 2015) for the proposed IHA. The information regarding the potential impacts on pinnipeds from the proposed IHA has not changed. Please refer to the proposed IHA for the full discussion.

Regarding effects of aircraft overflight on cetaceans, NMFS conducted additional analysis to evaluate the potential airborne noise that enters water which might result in takes of cetacean species. Takes of cetaceans (or other marine mammal species) incidental to aerial overflights depends on a variety of factors, such flight altitude, flight speed, types of aircraft, and species of marine mammals and their sensitivity to aircraft and their density in the vicinity under the flight route.

Shell stated that the potential maximum areas under a  $26^\circ$  cone of sea surface when the aircraft fly below 1,000 ft is  $169 \text{ km}^2$ . Multiplying this area by cetacean density yielded a total of 1 beluga, 2 bowhead, and 2 gray whales being exposed in the total area of the  $26^\circ$  cone. However, received noise levels within this  $26^\circ$  cone area is expected to vary greatly from the center below the flight path to the edge where the  $13^\circ$  incidental angle forms between the aircraft and sea surface. The only area where cetacean could be exposed to aircraft noise with minimum reflection from the sea surface is where the animal is normal to the aircraft, i.e., right beneath the flight path. As the one considers the distribution of animals that are not right beneath the flight path, the amount of airborne noise enters the water column is reduced exponentially as one

moves away from the normal angle, thus the underwater acoustic intensity away from the center is also reduced exponentially. At an incident angle of 13° from the aircraft, the acoustic wave undergoes total reflection. Therefore, NMFS considers that only a fraction of the cetaceans initially assessed in the **Federal Register** notice for the proposed IHA could be exposed, if they are at the sea surface. As a result, NMFS concludes that it is very unlikely that cetaceans would be affected by Shell's proposed ice overflight survey activities. Consequently, in the IHA issued to Shell, NMFS does not authorize any takes of cetacean species.

### **Anticipated Effects on Marine Mammal Habitat**

Shell's planned 2015/16 ice overflight surveys will not result in any permanent impact on habitats used by marine mammals, or to their prey sources. The primary potential impacts on marine mammal habitat and prey resources that are reasonably expected or reasonably likely are associated with elevated sound levels from the aircraft passing overhead. Effects on marine mammal habitat from the generation of sound from the planned surveys would be negligible and temporary, lasting only as long as the aircraft is overhead. Water column effects will be localized and ephemeral, lasting only the duration of the aircrafts presence. All effects on marine mammal habitat from the planned surveys are expected to be negligible and confined to very small areas within the Chukchi and Beaufort Seas. The proposed IHA contains a full discussion of the potential impacts to marine mammal habitat and prey species in the project area. No changes have been made to that discussion. Please refer to the proposed IHA for the full discussion of potential impacts to marine mammal habitat (80 FR 11398, March 3, 2015). NMFS has determined that Shell's ice overflight surveys are not expected to have any habitat-related effects that could cause significant or long-term consequences for marine mammals or on

the food sources that they utilize.

## **Mitigation**

In order to issue an incidental take authorization (ITA) under sections 101(a)(5)(A) and (D) of the MMPA, NMFS must, where applicable, set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (where relevant). A summary of the mitigation measures prescribed in the IHA issued to Shell include:

- A PSO will be aboard all flights recording all sightings/observations (e.g. including number of individuals, approximate age (when possible to determine), and any type of potential reaction to the aircraft). Environmental information the observer will record includes weather, air temperature, cloud and ice cover, visibility conditions, and wind speed.
- The aircraft will maintain a 1 mi radius when flying over areas where seals appear to be concentrated in groups of  $\geq 5$  individuals;
- The aircraft will not land on ice within 0.5 mi of hauled out pinnipeds or polar bears;
- The aircraft will avoid flying over polynyas and along adjacent ice margins as much as possible to minimize potential disturbance to cetaceans; and
- Shell will routinely engage with local communities and subsistence groups to ensure no disturbance of whaling or other subsistence activities.

### *Mitigation Conclusions*

NMFS has carefully evaluated the applicant's proposed mitigation measures and considered other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals,
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned, and
- The practicability of the measure for applicant implementation.

Any mitigation measure(s) prescribed by NMFS should be able to accomplish, have a reasonable likelihood of accomplishing (based on current science), or contribute to the accomplishment of one or more of the general goals listed below:

1. Avoidance or minimization of injury or death of marine mammals wherever possible (goals 2, 3, and 4 may contribute to this goal).
2. A reduction in the numbers of marine mammals (total number or number at biologically important time or location) exposed to received levels of noises generated from ice overflight surveys, or other activities expected to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

3. A reduction in the number of times (total number or number at biologically important time or location) individuals would be exposed to received levels of noises generated from ice overflight surveys, or other activities expected to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).
4. A reduction in the intensity of exposures (either total number or number at biologically important time or location) to received levels of noises generated from ice overflight surveys, or other activities expected to result in the take of marine mammals (this goal may contribute to a, above, or to reducing the severity of harassment takes only).
5. Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time.
6. For monitoring directly related to mitigation – an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Based on our evaluation of the applicant's mitigation measures, as well as other measures considered by NMFS, NMFS has determined that the prescribed mitigation measures provide the means of effecting the least practicable impact on marine mammals species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Mitigation measures to ensure availability of such species or stock for taking for certain subsistence uses are discussed later in this document (see “*Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses*” section).

## **Monitoring and Reporting**

In order to issue an ITA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must, where applicable, set forth “requirements pertaining to the monitoring and reporting of such taking”. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the action area.

Monitoring measures prescribed by NMFS should accomplish one or more of the following general goals:

1. An increase in the probability of detecting marine mammals, both within the mitigation zone (thus allowing for more effective implementation of the mitigation) and in general to generate more data to contribute to the analyses mentioned below;
2. An increase in our understanding of how many marine mammals are likely to be exposed to levels of noises generated from exploration drilling and associated activities that we associate with specific adverse effects, such as behavioral harassment, TTS, or PTS;
3. An increase in our understanding of how marine mammals respond to stimuli expected to result in take and how anticipated adverse effects on individuals (in

different ways and to varying degrees) may impact the population, species, or stock (specifically through effects on annual rates of recruitment or survival) through any of the following methods:

- Behavioral observations in the presence of stimuli compared to observations in the absence of stimuli (need to be able to accurately predict received level, distance from source, and other pertinent information);
  - Physiological measurements in the presence of stimuli compared to observations in the absence of stimuli (need to be able to accurately predict received level, distance from source, and other pertinent information);
  - Distribution and/or abundance comparisons in times or areas with concentrated stimuli versus times or areas without stimuli;
4. An increased knowledge of the affected species; and
  5. An increase in our understanding of the effectiveness of certain mitigation and monitoring measures.

### *Monitoring Measures*

#### (1) Protected Species Observers

Aerial monitoring for marine mammals will be conducted by a trained protected species observer (PSO) aboard each flight. PSO duties will include watching for and identifying marine mammals, recording their numbers, distances from, and potential reactions to the presence of the aircraft, in addition to working with the helicopter pilots to identify areas for landings on ice that

are clear of marine mammals.

(2) Observer Qualifications and Training

Observers will have previous marine mammal observation experience in the Chukchi and Beaufort Seas. All observers will be trained and familiar with the marine mammals of the area, data collection protocols, reporting procedures, and required mitigation measures.

(3) Specialized Field Equipment

The following specialized field equipment for use by the onboard PSO: Fujinon 7 X 50 binoculars for visual monitoring, a GPS unit to document the route of each ice overflight, a laptop computer for data entry, a voice recorder to capture detailed observations and data for post flight entry into the computer, and digital still cameras.

(4) Field Data-Recording

The observer on the aircraft will record observations directly into computers using a custom software package. The accuracy of the data entry will be verified in the field by computerized validity checks as the data are entered, and by subsequent manual checking following the flight. Additionally, observers will capture the details of sightings and other observations with a voice recorder, which will maximize observation time and the collection of data. These procedures will allow initial summaries of data to be prepared during and shortly after the surveys, and will facilitate transfer of the data to statistical, graphical or other programs for further processing.

During the course of the flights, the observer will record information for each sighting including number of individuals, approximate age (when possible to determine), and any type of potential reaction to the aircraft. Environmental information the observer will record includes

weather, air temperature, cloud and ice cover, visibility conditions, and wind speed.

### *Reporting Measures*

#### (1) Final Report

The results of Shell's ice overflight monitoring report will be presented in an initial "90-day" final report due to NMFS within 90 days after the expiration of the IHA. The report will include:

- Summaries of monitoring effort: total hours, total distances flown, and environmental conditions during surveys;
- Summaries of occurrence, species composition, and distribution of all marine mammal sightings including date, numbers, age/size/gender categories (when discernible), group sizes, ice cover and other environmental variables; data will be visualized by plotting sightings relative to the position of the aircraft;
- Analyses of the potential effects of ice overflights on marine mammals and the number of individuals that may have been disturbed by aircraft;
- Information and a map on the altitude at which aircraft were flown and the distance and altitude at which behavioral responses were noted; and
- Marine mammal sightings and behavioral response data for landing events.

The "90-day" report will be subject to review and comment by NMFS. Any recommendations made by NMFS must be addressed in the final report prior to acceptance by NMFS.

#### (2) Notification of Injured or Dead Marine Mammals

Shell will be required to notify NMFS' Office of Protected Resources and NMFS'

Stranding Network of any sighting of an injured or dead marine mammal. Based on different circumstances, Shell may or may not be required to stop operations upon such a sighting. Shell will provide NMFS with the species or description of the animal(s), the condition of the animal(s) (including carcass condition if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

#### *Monitoring Plan Peer Review*

The MMPA requires that monitoring plans be independently peer reviewed “where the proposed activity may affect the availability of a species or stock for taking for subsistence uses” (16 U.S.C. 1371(a)(5)(D)(ii)(III)). Regarding this requirement, NMFS’ implementing regulations state, “Upon receipt of a complete monitoring plan, and at its discretion, [NMFS] will either submit the plan to members of a peer review panel for review or within 60 days of receipt of the proposed monitoring plan, schedule a workshop to review the plan” (50 CFR 216.108(d)).

NMFS established an independent peer review panel to review Shell’s 4MP for the proposed ice overflight surveys in the Beaufort and Chukchi Seas. The panel met in early March 2015, and provided comments and recommendations to NMFS in April 2015. The full panel report can be viewed on the Internet at: <http://www.nmfs.noaa.gov/pr/permits/incidental.htm>.

NMFS provided the panel with Shell’s IHA application and monitoring plan and asked the panel to answer the following questions:

1. Will the applicant’s stated objectives effectively further the understanding of the impacts of their activities on marine mammals and otherwise accomplish the goals stated above?  
If not, how should the objectives be modified to better accomplish the goals above?
2. Can the applicant achieve the stated objectives based on the methods described in the

plan?

3. Are there technical modifications to the proposed monitoring techniques and methodologies proposed by the applicant that should be considered to better accomplish their stated objectives?

4. Are there techniques not proposed by the applicant (i.e., additional monitoring techniques or methodologies) that should be considered for inclusion in the applicant's monitoring program to better accomplish their stated objectives?

5. What is the best way for an applicant to present their data and results (formatting, metrics, graphics, etc.) in the required reports that are to be submitted to NMFS (i.e., 90-day report and comprehensive report)?

The peer-review panel report contains recommendations that the panel members felt were applicable to the Shell' monitoring plans. Specifically, the panel recommended that:

(1) Aircraft crew members receive the same training as PSOs so that they are able to 1) detect pinnipeds hauled out on the ice, 2) identify marine mammals sighted by species (when possible) and 3) indicate any behavioral response of marine mammals to the aircraft;

(2) Use of a video camera during overflight surveys to record behavioral responses in addition to having PSOs and trained crew members record behavioral responses;

(3) Provide information and a map on the altitude at which aircraft were flown and the distance and altitude at which behavioral responses were noted in the 90-day report; and

(4) Present sightings and behavioral response data separately for landing events (if animals were seen during that time).

NMFS discussed these recommendations with Shell to improve its monitoring and

reporting measures. As a result, Shell agrees to provide information and a map on the altitude at which aircraft were flown and the distance and altitude at which behavioral responses were noted in the 90-day report. In addition, Shell will present sightings and behavioral response data separately for landing events (if animals were seen during that time).

However, NMFS considers that using aircraft crew members (the pilots) to collect marine mammal data a safety concern and could not be implemented under Shell's aviation standards. As stated in the monitoring plan, one trained biologist PSO will be aboard each flight collecting data. All personnel aboard the aircraft will be instructed to inform the PSO if they observe a marine mammal hauled out in the vicinity of a location where landing is being considered. Species identification training will not be necessary to perform this task.

NMFS also discussed with Shell in regards to the panel's recommendation of using video camera. Based on Shell's experience from testing a video camera during marine mammal aerial survey flights in 2012, we confirmed that the resolution is not good enough to observe seals ahead of the aircraft without using a long lens (or high magnification setting). Use of a long lens significantly reduces the field of view of the camera and thereby reduces the chance of recording animals as the aircraft approaches close to and over them. Use of a long lens also significantly limits the lateral swath covered which limits the ability to record and assess potential reactions at increasing lateral distances. Therefore, NMFS does not consider adding a video camera would achieve intended results of behavioral observation.

Additionally, though not requested, the peer review panel also provided two recommendations for mitigation measures listed below:

- (1) Aircraft maintain an altitude of at least 305 m (1,000 ft) until they reach the

offshore survey areas of interest, and not land on ice within 1.6 km (1 mi) of hauled-out pinnipeds. These technical modifications should help to minimize disturbance of marine mammals encountered during surveys and quantify more accurately numbers of Level B harassment takes.

(2) Investigate the possibility of using unmanned aerial systems (UAS) to conduct the ice surveys, at least for the fixed-wing surveys that would not involve landing on the ice to collect samples

NMFS discussed with Shell these mitigation recommendations and concluded that these measures were not practicable, as explained next..

Shell states that their objectives of data collection on ice conditions would not be met if flights were conducted entirely at or above the altitude recommended by the panel. Nevertheless, Shell agrees to not landing on ice within 1,400 m of hauled-out pinnipeds. The updated mitigation measure is included in the IHA issued to Shell.

Shell states that it is interested in and actively pursuing the use of unmanned systems to conduct aerial surveys. However, the available technology and permitting process will not allow for the collection of the data sought by the proposed ice overflights at this time. Shell is collaborating with BOEM and NMML to improve use of UAS for open water observations and developing detection software to quickly process the thousands of digital images taken during a typical aerial survey. Shell is also advocating for rule changes by the FAA to allow for expanded commercial use of UAS systems.

### **Estimated Take by Incidental Harassment**

Except with respect to certain activities not pertinent here, the MMPA defines

“harassment” as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]. Only take by Level B behavioral harassment is anticipated as a result of the proposed ice overflight surveys.

As discussed earlier in this document, regarding effects of aircraft overflight on cetaceans, NMFS conducted additional analysis and determined that airborne noise from aircraft will not affect cetaceans. Therefore, no cetacean take is authorized for Shell’s ice overflight surveys.

#### *Basis for Estimating “Take by Harassment”*

Exposures of seals were calculated by multiplying the anticipated area to be flown over open water and ice in each season (winter and spring) by the expected densities of seals that may occur in the survey area by the proportion of seals on ice that may actually show a disturbance reaction to each type of aircraft (Born et al. 1999).

#### *Marine Mammal Density Estimates*

Marine mammal density estimates in the Chukchi and Beaufort Seas have been derived for two time periods: the winter period covering November through April, and the spring period including May through early July.

There is some uncertainty about the representativeness of the data and assumptions used in the calculations. To provide some allowance for uncertainties, “average” as well as “maximum” estimates of the numbers of marine mammals potentially affected have been

derived. For a few species, several density estimates were available. In those cases, the mean and maximum estimates were determined from the reported densities or survey data. In other cases, only one or no applicable estimate was available, so correction factors were used to arrive at “average” and “maximum” estimates. These are described in detail in the following sections.

In Polar Regions, most pinnipeds are associated with sea ice and typical census methods involve counting pinnipeds when they are hauled out on ice. In the Beaufort Sea, abundance surveys typically occur in spring when ringed seals emerge from their lairs (Frost *et al.* 2004). Depending on the species and study, a correction factor for the proportion of animals hauled out at any one time may or may not have been applied (depending on whether an appropriate correction factor was available for the particular species, area, and time period). By applying a correction factor, the density of the pinniped species in an area can be estimated.

Detectability bias, quantified in part by  $f(0)$ , is associated with diminishing sightability with increasing lateral distance from the survey trackline. Availability bias,  $g(0)$ , refers to the fact that there is <100 percent probability of sighting an animal that is present along the survey trackline. Some sources below included these correction factors in the reported densities (e.g. ringed seals in Bengtson *et al.* 2005) and the best available correction factors were applied to reported results when they had not already been included (e.g. bearded seals in Bengtson *et al.* 2005).

(1) Pinnipeds: Winter

(A) Ringed Seals

Ringed seal densities were taken from offshore aerial surveys of the pack ice zone conducted in spring 1999 and 2000 (Bengtson *et al.* 2005). Seal distribution and density in

spring, prior to break-up, are thought to reflect distribution patterns established earlier in the year (i.e., during the winter months; Frost *et al.* 2004). The average density from those two years (weighted by survey effort) was 0.4892 seals/km<sup>2</sup>. This value served as the average density while the highest density from the two years (0.8100 seals/km<sup>2</sup> in 1999) was used as the maximum density.

#### (B) Other Seal Species

Other seal species are not expected to be present in the ice overflight survey area in large numbers during the winter period of the ice overflights. Bearded, spotted, and ribbon seals would be present in the area in smaller numbers than ringed seals during spring through fall summer, but these less common seal species generally migrate into the southern Chukchi and Bering Seas during fall and remain there through the winter (Allen and Angliss 2014). Few satellite-tagging studies have been conducted on these species in the Beaufort Sea, winter surveys have not been conducted, and a few bearded seals have been reported over the continental shelf in spring prior to general break-up. However, the tracks of three bearded seals tagged in 2009 moved south into the Bering Sea along the continental shelf by November (Cameron and Boveng 2009). These species would be more common in the area during spring through fall, but it is possible that some individuals, bearded seals in particular, may be present in the area surveyed in winter. Ribbon seals are unlikely to be present in the survey area during winter as they also migrate southward from the northeastern Chukchi Sea during this period. In the absence of better information from the published literature or other sources that would indicate that significant numbers of any of these species might be present during winter, minimal density estimates were used for these species. Estimates for bearded seals were assumed to be slightly higher than those

for spotted and ribbon seals.

(2) Pinnipeds: Spring

Three species of pinnipeds under NMFS' jurisdiction are likely to be encountered in the Chukchi and Beaufort Seas during planned ice overflights in spring of 2015: ringed, bearded, and spotted seals. Ringed and bearded seals are associated with both the ice margin and the nearshore open water area during spring. Spotted seals are often considered to be predominantly a coastal species except in the spring when they may be found in the southern margin of the retreating sea ice. However, satellite tagging has shown that some individuals undertake long excursions into offshore waters during summer (Lowry *et al.* 1994, 1998). Ribbon seals have been reported in very small numbers within the Chukchi Sea by observers on industry vessels (Patterson *et al.* 2007, Hartin *et al.* 2013).

(A) Ringed Seal and Bearded Seal

Ringed seal and bearded seal "average" and "maximum" spring densities were available in Bengtson *et al.* (2005) from spring surveys in the offshore pack ice zone (zone 12P) of the northern Chukchi Sea. However, corrections for bearded seal availability,  $g(0)$ , based on haulout and diving patterns were not available.

(B) Spotted Seal

Little information on spotted seal densities in offshore areas of the Alaskan Arctic is available. Spotted seal densities in the spring were estimated by multiplying the ringed seal densities by 0.02. This was based on the ratio of the estimated occurrence of the two species during ice overflight surveys and the assumption that the vast majority of seals present in areas of pack ice would be ringed seals (Funk *et al.*, 2010; 2013).

(C) Ribbon Seal

Four ribbon seal sightings were reported during industry vessel operations in the Chukchi Sea in 2006-2010 (Hartin *et al.* 2013). The resulting density estimate of 0.0007/km<sup>2</sup> was used as the average density and 4 times that was used as the maximum for the spring season.

*Estimated Areas Where Seals May be Encountered by Aircraft*

Fixed wing and helicopter flights over ice at ice overflight survey altitudes have the potential to disturb seals hauled out on ice, although the flight altitude and lateral distances at which seals may react to aircraft are highly variable (Born *et al.* 1999; Burns *et al.* 1982; Burns and Frost 1979). The probability of a seal hauled out on ice reacting to a fixed wing aircraft or helicopter is influenced by a combination of variables such as flight altitude, lateral distance from the aircraft, ambient conditions (e.g., wind chill), activity, and time of day (Born *et al.* 1999). Evidence from flyover studies of ringed and bearded seals suggests that a reaction to helicopters is more common than to fixed wing aircraft, all else being equal (Born *et al.* 1999; Burns and Frost 1979).

Born *et al.* (1999) investigated the reactions of ringed seals hauled out on ice to aircraft. The threshold lateral distances from the aircraft trackline out to which the vast majority of reactions were observed were 600 and 1500 m for fixed wing aircraft and helicopters, respectively. Many individual ringed seals within these distances; however, did not react (Born *et al.* 1999). Results indicated ~6% and ~49% of total seals observed reacted to fixed wing aircraft and helicopters, respectively, by entering the water when aircraft were flown over ice at altitudes similar to those proposed for Shell's ice overflight surveys as described in the Description of the Specific Activity section. These lateral distances and reaction probabilities were used as

guidelines for estimating the area of sea ice habitat within which hauled out seals may be disturbed by aircraft and the number of seals that might react. Born *et al.* 1999, also was used as a guideline in a similar fashion for estimating the numbers of seals that would react to helicopters during US Fish and Wildlife Service polar bear tagging in 2011 and 2012, in which an IHA was issued by NMFS (NMFS 2011).

Table 2 summarizes potential disturbance radii, maximum flight distances, and potential disturbance areas for seals from fixed wing aircraft and helicopters during Shell's proposed ice overflights program in winter (November through April) and spring (May through early July). Based on maximum flight distances and potential disturbance radii of 600 and 1500 m for fixed wing aircraft and helicopters, respectively, a total of 11,112 km<sup>2</sup> (of sea ice could be disturbed. Based on Born *et al.*'s (1999) observations, however, it is estimated that only ~6 and ~49% of seals in these areas will exhibit a notable reaction to fixed wing aircraft and helicopters, respectively, by entering the water. Approximately 60% of this total area would be surveyed in winter and the remaining 40% would be surveyed during spring.

**Table 2. Potential disturbance radii, maximum flight distances over open water, and potential disturbance areas for seals in open water from fixed wing aircraft and helicopters in the Chukchi and Beaufort Seas, Alaska, during the proposed 2015-2016 ice overflight survey program**

	Potential Disturbance Radius (km)	Maximum Flight Distance (km)		Potential Disturbance Area (km <sup>2</sup> )	
		Winter	Spring	Winter	Spring
<b>Aircraft</b>					
Fixed Wing	0.6	4,630	2,778	5,557	3,335
Helicopter	1.5	370	370	1,110	1,110
<b>Grand Totals</b>		<b>5,000</b>	<b>3,148</b>	<b>6,667</b>	<b>4,445</b>

### *Potential Number of “Takes by Harassment”*

This subsection provides estimates of the number of individual ice seals that could potentially be harassed by aircraft during Shell’s proposed ice overflights. The estimates are based on a consideration of the proposed flight distances, proximity of seals to the aircraft trackline, and the proportion of ice seals present that might actually be disturbed appreciably (i.e. moving from the ice into the water) by flight operations in the Chukchi and Beaufort Seas and the anticipated area that could be subjected to disturbance from overflights.

The number of individuals of each ice seal species potentially disturbed by fixed wing aircraft or helicopters was estimated by multiplying:

- The potential disturbance area from each aircraft (fixed wing and helicopter) for each season (winter and spring), by
- The expected seal density in each season, and by
- The expected proportion of seals expected to react to each type of aircraft in a way that could be interpreted as disturbance.

The numbers of individuals potentially disturbed were then summed for each species across the two seasons.

Estimates of the average number of individual seals that may be disturbed are shown by season in Table 3. The estimates shown represent proportions of the total number of seals encountered that may actually demonstrate a disturbance reaction to each type of aircraft.

Estimates shown in Table 3 were based on Born *et al.* 1999, which assumed that ~6 and ~49% of seals would react within lateral distances of 600 and 1,500 m of fixed wing aircraft and

helicopters, respectively.

Ringed seal is by far the most abundant species expected to be encountered during the planned ice overflights. The best (average) estimate of the numbers of ringed seals potentially disturbed during ice overflights is 793 individuals, which represents only a small proportion of the estimated population of ringed seals in the Chukchi and Beaufort Seas. Fewer individuals of other pinniped species are estimated to be encountered during ice overflights, also representing very small proportions of their populations.

**Table 3. The total number of potential exposures of marine mammals during the Shell's proposed ice overflight surveys in the Chukchi and Beaufort Seas, Alaska, 2015-2016. Estimates are also shown as a percent of each population**

<b>Species</b>	<b>Abundance</b>	<b>Number potential exposure</b>	<b>% Estimated population</b>
Bearded seal	155,000	11	0.007
Ribbon seal	49,000	1	0.002
Ringed seal	300,000	793	0.264
Spotted seal	141,479	7	0.005

## **Analysis and Determinations**

### *Negligible Impact*

Negligible impact is “an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival” (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (i.e., population-level effects). An estimate of the number of Level B harassment takes, alone, is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be “taken” through behavioral harassment, NMFS must consider other factors, such as the likely nature of any

responses (their intensity, duration, etc.), the context of any responses (critical reproductive time or location, migration, etc.), as well as the number and nature of estimated Level A harassment takes, the number of estimated mortalities, effects on habitat, and the status of the species. To avoid repetition, the discussion of our analyses applies to all the species listed in Table 1, given that the anticipated effects of this project on different marine mammal species are expected to be relatively similar in nature. Additionally, there is no information about the size, status, or structure of any species or stock that would lead to a different analysis for this activity.

No injuries or mortalities are anticipated to occur as a result of Shell's proposed ice overflight surveys in the Beaufort and Chukchi Seas, and none are authorized. Additionally, animals in the area are not expected to incur hearing impairment (i.e., TTS or PTS) or non-auditory physiological effects. Instead, any impact that could result from Shell's activities is most likely to be behavioral harassment of brief duration as the aircraft flies by. Although it is possible that some individuals may be exposed to sounds from aircraft overflight more than once, during the migratory periods it is less likely that this will occur since animals will continue to move across the Chukchi Sea towards their wintering grounds.

Aircraft noises are heard underwater only within a very limited area within a 26 degree cone and their intensities are expected to diminish exponentially away from directly under the fly path. Therefore, cetaceans are not expected to be affected.

Of the four pinniped species likely to occur in the proposed ice overflight survey area, only the Arctic stock of ringed seal is listed as threatened under the ESA. This species is also designated as "depleted" under the MMPA. On July 25, 2014 the U.S. District Court for the District of Alaska vacated the rule listing to the Beringia bearded seal DPS and remanded the

rule to NMFS to correct the deficiencies identified in the opinion. None of the other species that may occur in the project area is listed as threatened or endangered under the ESA or designated as depleted under the MMPA. There is currently no established critical habitat in the proposed project area for any of these pinniped species.

Potential impacts to marine mammal habitat were discussed previously in this document (see the “Anticipated Effects on Habitat” section). Although some disturbance is possible to food sources of marine mammals, the impacts are anticipated to be minor. Based on the vast size of the Arctic Ocean where feeding by marine mammals occurs versus the localized area of the ice overflight surveys, any missed feeding opportunities in the direct project area would be of little consequence, as marine mammals would have access to other feeding grounds.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS finds that the total marine mammal take from Shell’s proposed 2015 ice overflight surveys in the Chukchi and Beaufort Seas will have a negligible impact on the affected marine mammal species or stocks.

#### *Small Numbers*

The estimated takes proposed to be authorized represent less than 0.3% of the affected population or stock for all species in the survey area. Based on this, NMFS finds that small numbers of marine mammals will be taken relative to the populations of the affected species or stocks.

#### **Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses**

##### *Potential Impacts to Subsistence Uses*

NMFS has defined “unmitigable adverse impact” in 50 CFR 216.103 as: “an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

Subsistence hunting continues to be an essential aspect of Inupiat Native life, especially in rural coastal villages. The Inupiat participate in subsistence hunting activities in and around the Beaufort and Chukchi Seas. The animals taken for subsistence provide a significant portion of the food that will last the community through the year. Marine mammals represent on the order of 60-80% of the total subsistence harvest. Along with the nourishment necessary for survival, the subsistence activities strengthen bonds within the culture, provide a means for educating the younger generation, provide supplies for artistic expression, and allow for important celebratory events.

#### *Bowhead Whale*

Activities associated with Shell’s planned ice overflight survey program are not likely to have an unmitigable adverse impact on the availability of bowhead whales for taking for subsistence uses. Ice overflight surveys that may occur near Point Lay, Wainwright, Barrow, Nuiqsut, and Kaktovik would traverse bowhead subsistence areas. The most commonly observed reactions of bowheads to aircraft traffic are hasty dives, but changes in orientation, dispersal, and changes in activity are sometimes noted. Such reactions could potentially affect

subsistence hunts if the flights occurred near and at the same time as the hunt. Most flights will take place after the fall and prior to spring bowhead whale hunting from the villages. Shell will implement a number of mitigation measures to avoid such impacts. These mitigation measures include minimum flight altitudes, use of Village Community Liaison Officers (CLOs), Subsistence Advisors (SAs), and Communication Centers in order to avoid conflicts with subsistence activities. SA calls will be held while subsistence activities are underway during the ice overflight survey program and are attended by operations staff, logistics staff, and CLOs. Aircraft flights are adjusted as needed and planned in a manner that avoids potential impacts to bowhead whale hunts and other subsistence activities. .

#### *Beluga Whale*

Activities associated with Shell's planned ice overflight survey program will not have an unmitigable adverse impact on the availability of beluga whales for taking for subsistence uses.

Ice overflight surveys may occur near Point Lay, Wainwright, Barrow, Nuiqsut, and Kaktovik would and traverse beluga whale hunt subsistence areas. Most flights would take place when belugas are not typically harvested. Survey activities could potentially affect subsistence hunts if the flights occurred near and at the same time as the hunt. Shell has developed mitigation measures to avoid any such impacts. These mitigation measures include minimum flight altitudes, use of CLOs, SAs, and Communication Centers. SA calls will be held while subsistence activities are underway during the ice overflight survey program and are attended by operations staff, logistics staff, and CLOs. Aircraft flights are adjusted as needed and planned in a manner that avoids any potential impacts to beluga whale hunts and other subsistence activities.

#### *Seals*

Seals are an important subsistence resource with ringed and bearded seals making up the bulk of the seal harvest. The survey areas are far outside of areas reportedly utilized for the harvest of seals by the villages of Point Hope, thus the ice overflight surveys will not have an unmitigable adverse impact on the availability of ice seals for taking for subsistence uses. The survey areas encompass some areas utilized by residents of Point Lay, Wainwright, Barrow, Nuiqsut and Kaktovik for the harvest of seals. Most ringed and bearded seals are harvested in the winter and a harvest of seals could possibly be affected by Shell's planned activities. Spotted seals are harvested during the summer and may overlap briefly with Shell's planned activities. Most seals are harvested in coastal waters, with available maps of recent and past subsistence use areas indicating that seal harvests have occurred only within 30-40 mi (48-64 km) off the coastline. Some of the planned ice overflight surveys would take place in areas used by the village residents for the harvest of seals. The survey aircraft could potentially travel over areas used by residents for seal hunting and could potentially disturb seals and, therefore, subsistence hunts for seals. Any such effects from the survey activities would be minimal due to the infrequency of the planned surveys. Shell will implement a number of mitigation measures which include a proposed 4MP, use of CLOs, SAs, operation of Communication Centers, and minimum altitude requirements. SA calls will be held while subsistence activities are underway during the ice overflight survey program and are attended by operations staff, logistics staff, and CLO's. Aircraft movements and activities are adjusted as needed and planned in a manner that avoids potential impacts to subsistence activities. With these mitigation measures any effects on ringed, bearded, and spotted seals as subsistence resources, or effects on subsistence hunts for seals, would be minimal.

### *Plan of Cooperation or Measures to Minimize Impacts to Subsistence Hunts*

Regulations at 50 CFR 216.104(a)(12) require IHA applicants for activities that take place in Arctic waters to provide a Plan of Cooperation (POC) or information that identifies what measures have been taken and/or will be taken to minimize adverse effects on the availability of marine mammals for subsistence purposes.

Shell has prepared a POC in accordance with NMFS' regulations. The POC relies upon the Chukchi Sea Communication Plans to identify the measures that Shell has developed in consultation with North Slope subsistence communities and will implement during its planned 2015/2016 ice overflight surveys to minimize any adverse effects on the availability of marine mammals for subsistence uses. In addition, the POC details Shell's communications and consultations with local subsistence communities concerning its planned 2015/2016 program, potential conflicts with subsistence activities, and means of resolving any such conflicts (50 CFR 216.104(a) (12) (i), (ii), and (iv)). The POC identifies and documents potential conflicts and associated measures that will be taken to minimize any adverse effects on the availability of marine mammals for subsistence use.

Meetings between Shell and villages were held in Barrow and Point Lay in early November 2014 and in other villages in early 2015. Throughout 2015 and 2016 Shell anticipates continued engagement with the marine mammal commissions and committees active in the subsistence harvests and marine mammal research.

Following the 2015/2016 season, Shell intends to have a post-season co-management meeting with the commissioners and committee heads to discuss results of mitigation measures and outcomes of the preceding season. The goal of the post-season meeting is to build upon the

knowledge base, discuss successful or unsuccessful outcomes of mitigation measures, and possibly refine plans or mitigation measures if necessary.

In addition to the POC, the following subsistence mitigation measures will be implemented for Shell's ice overflight surveys and are required in the IHA issued to Shell.

(1) Communications

- Shell has developed a Communication Plan and will implement this plan before initiating ice overflight survey operations to coordinate activities with local subsistence users, as well as Village Whaling Captains' Associations, to minimize the risk of interfering with subsistence hunting activities, and keep current as to the timing and status of the bowhead whale hunt and other subsistence hunts.
- Shell will employ local CLOs and/or SAs from the Chukchi Sea villages that are potentially impacted by Shell's ice overflight surveys. The CLOs and SAs will provide consultation and guidance regarding the whale migration and subsistence activities. There will be one per village. The CLO and/or SA will use local knowledge (Traditional Knowledge) to gather data on the subsistence lifestyle within the community and provide advice on ways to minimize and mitigate potential negative impacts to subsistence resources during the survey season. Responsibilities include reporting any subsistence concerns or conflicts; coordinating with subsistence users; reporting subsistence-related comments, concerns, and information; and advising how to avoid subsistence conflicts.

(2) Aircraft Travel

- The aircraft will maintain a 1 mi (1.6 km) radius when flying over areas where seals appear to be concentrated in groups of  $\geq 5$  individuals.

- The aircraft will not land on ice within 1,400 m of hauled out pinnipeds.
- The aircraft will avoid flying over polynyas and along adjacent ice margins as much as possible to minimize potential disturbance to cetaceans.
- Aircraft shall not operate below 1,500 ft (457 m) in areas of active whale hunting; such areas to be identified through communications with the Com Centers and SAs.
- Shell will routinely engage with local communities and subsistence groups to ensure no disturbance of whaling or other subsistence activities.

#### *Unmitigable Adverse Impact Analysis and Determination*

Based on the description of the specified activity, the measures described to minimize adverse effects on the availability of marine mammals for subsistence purposes, and the mitigation and monitoring measures, NMFS has determined that there will not be an unmitigable adverse impact on subsistence uses from Shell's proposed activities.

#### **Endangered Species Act (ESA)**

There are two marine mammal species listed as endangered under the ESA with confirmed or possible occurrence in the proposed project area: the bowhead whale and ringed seal. NMFS' Permits and Conservation Division initiated consultation with NMFS' Endangered Species Division under section 7 of the ESA on the issuance of an IHA to Shell under section 101(a)(5)(D) of the MMPA for this activity. On May 20, 2015, NMFS issued a Biological Opinion, and concluded that the issuance of the IHA associated with Shell's 2015/2016 ice overflight surveys in the Beaufort and Chukchi Seas are not likely to jeopardize the continued existence of the threatened ringed seal and will have no effect on bowhead whale. No critical habitat has been designated for this species, therefore it will be affected.

## **National Environmental Policy Act (NEPA)**

NMFS prepared an EA that includes an analysis of potential environmental effects associated with NMFS' issuance of an IHA to Shell to take marine mammals incidental to conducting ice overflight surveys in the Beaufort and Chukchi Seas, Alaska. NMFS has finalized the EA and prepared a FONSI for this action. Therefore, preparation of an Environmental Impact Statement is not necessary. NMFS' draft EA was available to the public for a 30-day comment period before it was finalized.

## **Authorization**

As a result of these determinations, NMFS has issued an IHA to Shell for the take of marine mammals, by Level B harassment, incidental to conducting ice overflight surveys in the Beaufort and Chukchi Seas in 2015/2016, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

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